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MEMORANDUM

To: Gary Miller
U.S. Environmental Protection Agency

Date: September 7, 2011

From: Jennifer Sampson, Integral Consulting Inc.
David Keith, Anchor QEA, LLC

Cc: March Smith and Andrew Shafer, McGinnes Industrial Maintenance Corporation
Philip Slowiak, International Paper Company

Re: Summary of RI/FS Data Gaps and Sampling Proposal Outline, San Jacinto River
Waste Pits Superfund Site

INTRODUCTION

This memorandum presents a summary of the data gaps for the San Jacinto River Waste Pits (SJRWP) Remedial Investigation/Feasibility Study (RI/FS) that were identified in the draft Preliminary Site Characterization Report (PSCR) (Integral and Anchor QEA 2011), submitted to USEPA on July 20, 2011. This submittal contains greater detail in support of additional sampling, and provides conceptual outlines of sampling approaches that would address the data gaps. All new data would be added to the existing data set, and none of the existing data would be discarded or replaced. This memorandum is being submitted during USEPA review of the draft PSCR because it will be necessary to resolve the issue of data gaps and develop an approved, consensus sampling approach by the end of September 2011 so that sampling can occur in October 2011. This schedule is necessary both to meet USEPA's schedule for the RI/FS, and to obtain samples that are comparable to samples collected during the original RI/FS sampling programs.

The RI/FS is being conducted at the SJRWP Superfund site (the Site) pursuant to the requirements of Unilateral Administrative Order, Docket No. 06-03-10 (USEPA 2009). This memorandum is submitted on behalf of International Paper Company and McGinnes Industrial Maintenance Corporation (collectively referred to as Respondents).

SUMMARY OF DATA GAPS

The draft PSCR concludes that the Site-specific background datasets for tissue and sediment are incomplete, and provides supporting rationale. The related text of the PSCR is excerpted below for tissue and sediment. Additional details are also presented below for both tissue and sediment that support the finding of the PSCR that these background data sets are incomplete.

The objective of additional sampling described in this memorandum is to accurately characterize the background condition. The Site-specific background dataset may have several uses in the RI/FS process, including the following:

- Comparison of Site-related and background risks, so that the incremental risk due to the Site can be accurately characterized
- Development of Preliminary Remediation Goals (PRGs), for which background concentrations in sediment, and even in tissue, may be a central consideration.

Both of these uses are fundamentally related to the same question: How much risk can be addressed by remediation at the Site? If the existing background dataset is insufficient to accurately characterize the actual background risk, or if background data is used to support development of a PRG that does not account for the other sources of chemicals of potential concern (COPCs), the final remedial goals for the site may be unrealistic and unachievable. To develop a successful remedial program, it is necessary to have an accurate representation of the background condition for both tissue and sediments.

Tissue Data Gaps

Toxicity equivalent concentrations of dioxins and furans (TEQ_{DF}) in catfish fillet and blue crab tissue collected from Cedar Bayou for the RI/FS are noticeably lower than concentrations in edible tissue of these species from any other study for the lower San Jacinto River and Upper Galveston Bay in the RI/FS database. Section 6.2.2 of the draft PSCR reports on data from these other studies as follows:

“The 151 samples of blue crab edible tissue collected by these studies had a range of TEQ_{DF} of 0.05 to 15.8 ng/kg, with a mean of 3.11 ng/kg and a 95th percentile at 8.86 ng/kg. These values are substantially greater than the

0.14 ng/kg TEQ_{DF} [reference envelope value, or REV] calculated for crab edible tissue collected from Cedar Bayou as part of the RI (Table 6-50). In fact, the maximum TEQ_{DF} for the crab samples from Cedar Bayou (0.113 ng/kg) was lower than the 10th percentile of these historical data collected by TCEQ and TDSHS throughout the San Jacinto and Galveston Bay system. The data for all other COPCs were also higher in the historical state datasets (where data for other COPCs were available) compared to crabs collected from Cedar Bayou; exceptions were aluminum, arsenic, and manganese, for which concentrations ranges were comparable between Cedar Bayou and the other offsite data, and magnesium and mercury, which had a larger range in Cedar Bayou compared to the historical offsite data.

Similar patterns were also observed for hardhead catfish fillet, with 81 measurements of TEQ_{DF} for samples collected from outside the preliminary Site perimeter, both upstream and downstream of the Site. These samples have a range of TEQ_{DF} between 0.40 and 16.0 ng/kg, with a mean of 5.7 and 95th percentile of 12.3 ng/kg, respectively. The maximum TEQ_{DF} concentration (0.389 ng/kg) for catfish samples from Cedar Bayou areas collected in the RI dataset (Table 6-52) is below the minimum value observed throughout the San Jacinto and Galveston Bay ecosystem in the historical data collected by state agencies.”

To provide a more detailed perspective on these differences, tissue concentrations of dioxins, furans, and polychlorinated biphenyls (PCBs) in tissue samples from Cedar Bayou and from the reach of the San Jacinto River downstream of the confluence with Buffalo Bayou to Morgan’s Point (Area SJFCA5, Figure 1) were further evaluated for this data gaps memorandum. Specifically, data collected from SJFCA5 by the Texas Commission on Environmental Quality (TCEQ) for the Total Maximum Daily Load (TMDL) program, and the Texas Department of State Health Services (TDSHS) data from 2002 and onward, were evaluated relative to the RI/FS data for Cedar Bayou. TCEQ and TDSHS sampling locations within SJFCA5, an alternative background sampling area considered in the Tissue Sampling and Analysis Plan (SAP) (Integral 2010), are shown in Figure 1.

The area in SJFCA5 was proposed as a background sampling area in the Tissue SAP to include in the characterization of background conditions the important influence of non-Site sources of COPCs on exposures of aquatic species that may range widely beyond the Site, even if they are captured on the Site. Because little is known about the specific movements and home ranges of blue crabs and hardhead catfish captured at the Site, it is uncertain what the concentrations of COPCs in edible tissues would be if the Site did not exist. Although this characterization is never completely attainable, sampling edible tissue of highly mobile species from areas known to be influenced by a wide range of urban COPC sources provides a valuable perspective on that uncertainty.

Simple comparisons of data from Cedar Bayou with data from SJFCA5 using the 2,3,7,8-tetrachlorinated dibenzo-*p*-dioxin (TCDD) toxicity equivalent (TEQ) calculated with dioxins and furans only (TEQ_{DF}) or with dioxin-like PCBs only (TEQ_P) are presented in the attached Figures 2 through 5. These illustrations show data for individual samples and aggregate statistics for TEQ_{DF} and TEQ_P in edible blue crab (Figures 2 and 3, respectively) and TEQ_{DF} and TEQ_P for hardhead catfish fillet (Figures 4 and 5, respectively). These figures clearly illustrate that the concentrations of TEQ_{DF} and TEQ_P in these two tissue types from Cedar Bayou are not representative of those in the general area. In all cases, the TEQ_{DF} or TEQ_P concentration in tissue from Cedar Bayou is statistically significantly lower than the concentrations in the corresponding tissue from SJFCA5 (Mann-Whitney-Wilcoxon, $p < 0.05$), consistent with the analysis presented in the draft PSCR, and excerpted above.

Although USEPA and its partner agencies may have expressed some concerns during discussion of the Tissue SAP that tissue in SJFCA5 is affected by the Site, the unmixing analysis presented in the draft PSCR indicates that dioxin and furan contamination of sediments that can be attributed to the paper mill wastes in the impoundments north of I-10 is localized to the Site. The unmixing results strongly suggest that a significant influence of the paper mill wastes on sediment and biological tissue several miles away is highly unlikely. The unmixing results support the use of SJFCA5, at least in part, as a source of data to characterize the regional background condition.

Based on the analysis presented in the PSCR and above, it is evident that the blue crab and hardhead catfish data from Cedar Bayou present a picture of background that does not reflect

the influence of important, non-Site-related regional sources of dioxins, furans, and PCBs on tissues elsewhere in the San Jacinto River and Galveston Bay system. Therefore, relying only on the Cedar Bayou tissue data for the Site-specific background in the SJRWP RI/FS will underrepresent the extent to which several receptors can be exposed to COPCs that are not attributable to the Site. This type of error could lead to development of unrealistic and unattainable remediation goals for the Site.

Sediment Data Gaps

The upstream sediment dataset collected to represent Site-specific background does not reflect the full range of percent fines and percent carbon, two physicochemical parameters in sediments that tend to correlate positively with chemical concentrations (Section 6.2.1, draft PSCR). The draft PSCR describes this problem as follows:

“In the RI sediment dataset, there is a statistically significant correlation¹ between percent fines (as clay plus silt) and TEQ_{DF} (Figure 6-18). Although only 39 percent of the variability of the TEQ_{DF} concentrations is explained by sediment fines, the relationship is both statistically significant and positive. Importantly, Figure 6-18 shows that about half of the range of percent fines in the sediment dataset is not reflected in the background data. Sediments with fines at greater than 50 percent are absent from the background dataset.

To determine whether this was just a reflection of the particle sizes within the impoundments north of I-10, box-whisker plots of grain size in sediments collected from 1) within the impoundments, 2) on the Site but outside of the 1966 impoundment perimeter, and 3) in the upstream background area were generated (Figure 6-19). The organic carbon content of these three compartments was also compared using box plots (Figure 6-19) ... Figure 6-19 strongly suggests that ranges of percent fines and organic carbon content in Site sediments are not fully represented by the upstream background dataset. The maxima and the medians of both the percent organic carbon and the

¹ Correlation of fine sediment (clay and silt) vs. TEQ_{DF}: $R^2=0.39$, $p < 0.05$

percent fines are lower in the upstream (background) sediment dataset than in the sediments that are on the Site but not within the impoundments.”

Figures 6-18 and 6-19 from the draft PSCR are included here as Figures 6 and 7, respectively, to illustrate these differences. In addition, statistical comparisons indicate that both the total organic content and the percent fines of the upstream sediment dataset are statistically significantly lower than in the sediments collected from within the preliminary Site perimeter and from within the northern impoundments themselves (Mann-Whitney-Wilcoxon, $p < 0.05$). This discussion in the draft PSCR concludes that “it appears that the upstream background sediment dataset, in terms of the objective physical characteristics that tend to correlate with the concentrations of organic compounds, are not representative of conditions on the Site. The existing upstream sediment dataset may therefore underestimate the concentrations of dioxins and furans in background sediments.”

As for the background tissue dataset, the upstream sediment dataset misrepresents the actual background condition. In the event that the existing Site-specific background sediment data provide a focal point for remedial goals, there is a substantial risk that these goals will be unrealistic and unattainable.

OUTLINE OF PROPOSED SAMPLING

A relatively limited sampling program can be conducted to resolve these two data gaps. This program would consist of collection of edible blue crab and catfish fillet samples from both upstream of the Site and at the southern extent of SJFCA5, and additional sediment sampling within the upstream background area. A few details are provided below for the proposed tissue and sediment sampling; we anticipate that additional specifics will be addressed collaboratively with USEPA before any sampling begins. Please also note that we are not proposing that any of the existing Site-specific background data be removed or replaced. Additional sediment and tissue data would be used to augment the existing data sets.

Tissue Sampling

A general outline of the proposed additional background tissue sampling is as follows:

- **Schedule:** Early October 2011. This is necessary to make the data compatible with the existing dataset, so that it will be appropriate to aggregate the new data with the existing data.
- **Location:** The upstream background area, and the southern end of SJFCA5, to the south of the Fred Hartman Bridge. The area to be sampled upstream is the same area within which sediment samples have already been collected for the RI. The area within SJFCA5 was originally under consideration for background tissue sampling, as described in the Tissue SAP. Tissue collected from this area will also better reflect COPC sources other than the Site in the tissues of mobile species within the San Jacinto River and Galveston Bay system. It is therefore a logical place to consider additional sampling. The specific sampling area within SJFCA5 will be limited to waters downstream, or south, of the Fred Hartman Bridge but still within SJFCA5.
- **Tissues:** Edible crab and catfish fillet. Ingestion of fish and crabs captured on the Site is a likely driver of risk to people. The background condition for these two tissue types is the most important data gap that needs to be addressed to effectively characterize incremental risks due to the Site. Ten samples of each tissue type consisting of composites from at least three individuals will be collected. Up to one-half of these will be taken from the area upstream of the Site, and the other half from the designated area within SJFCA5. Because the spatial distribution of catfish is somewhat dependent upon salinity, and the area upstream of the Site can contain substantial amounts of freshwater, catfish will be sampled for 3 days, or until 15 hardhead catfish (for 5 composites) of the appropriate size can be captured, whichever is less.
- **Analytes:** Dioxins and furans, percent lipid. The TMDL program has generated dioxin and furan tissue data for these tissues, but the most recent of these data were collected in 2004, and may therefore not represent current conditions. Whether the data for PCBs in tissue, which have been generated more recently (2008–2009), can be upgraded to Category 1 is under evaluation, but it is currently anticipated that no additional data for PCBs will be necessary.

Sediment Sampling

A general outline of the proposed sampling for additional sediment data is as follows:

- Schedule: Concurrent with or immediately following the tissue sampling.
- Location: In the approved upstream background area.
- Analytes: Dioxins and furans, grain size distribution and organic carbon content.
- Approach: The sampling program would specifically target sediments with a grain size distribution characterized by fines (clay plus silt) between 50 and 80 percent. Samples would be collected from 20 locations, selected in consultation with USEPA during the field sampling. Sampling locations would be targeted to meet the goal of obtaining sediment with the appropriate grain size distribution, and a field screen using a wet sieve may be employed to help select the appropriate sediments to submit for analysis. All samples submitted to the lab will be analyzed for percent fines. From those that have 50 to 80 percent fines, a subset of 10 will be selected for analysis of dioxins and furans. The results would be added to the background dataset for sediments.

CONCLUSION

Based on the evaluation of RI/FS data gaps for the SJRWP Site presented in the PSCR, and the additional analysis presented in this memorandum, concentrations of COPCs in catfish and crab tissue reported for Cedar Bayou are lower than for other areas of the San Jacinto River and Galveston Bay system that have not been influenced by releases from the Site. This is particularly evident for dioxins and furans. In addition, the upstream sediment dataset collected for the RI/FS does not reflect the full range of grain size distribution and organic carbon content present in sediments that are on the Site but outside of the 1966 impoundment perimeter. As a result, the range of background dioxin and furan concentrations that is relevant for comparisons with the Site may not be fully reflected in the available tissue and sediment background datasets. These differences represent important data gaps for the RI/FS, because background conditions may become an important consideration in risk management and remedial action decision-making for the Site. Implementation of a supplemental tissue and sediment sampling program as outlined above will address these data gaps in conformance with the requirements of the Unilateral Administrative Order for the RI/FS at the Site.

REFERENCES

USEPA, 2009. Unilateral Administrative Order for Remedial Investigation/Feasibility Study. U.S. EPA Region 6 CERCLA Docket No. 06-03-10. In the matter of: San Jacinto River Waste Pits Superfund Site Pasadena, Texas. International Paper Company, Inc. & McGinnes Industrial Management Corporation, respondents.
